slightly affected, were crossed. Of the 29 offspring resulting, 17 showed the defect in a severe form, and 12 showed only small blisters. A female which had only one wing affected, was mated to a male, one of whose wings was severely affected while the other bore a very small blister. Of the 45 offspring resulting, 27 bore the defect in a severe form on both wings and 18 showed small blisters again on both wings.

Further experiments with this new character were under way when the work was stopped by the mobilization of the Militia in June. The work with these flies, however, is again being resumed.

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A CASE OF REGENERATION IN PANULIRUS ARGUS[1]

THE occurrence of regenerative processes in the crustacea has been a matter of record for a number of years, but the instances have been mostly confined to the regeneration of appendages and portions of the nervous system. Observations on the regeneration of portions of the exoskeleton of the trunk are far less numerous. The present observations on the regeneration of a portion of the rostrum of *Panulirus argus*, the common crayfish of the Bermuda Islands, were made during the summer of 1916 at the Bermuda Biological Station.

Panulirus argus when full grown is about 14 to 16 inches in length. It lacks chelipeds, their place being taken by the ordinary type of walking appendage. None of the walking appendages is provided with nippers, all being tipped with a single hook, as, *e. g.*, in the fourth pair of appendages of the crayfish *Cambarus*. The rostrum of *Panulirus*, instead of being a single median projection, consists of a pair of long (30–35 mm.), sharply pointed spines, slightly compressed laterally, and growing out from the carapace just posterior and slightly dorsal to the base of the eye-stalks.

The animal in question was a half-grown male, eight and one half inches long. When caught, June 20, the left spine (compare figure and explanation) of the rostrum was entirely missing. The carapace around the base was jagged and rough, as though the break had been recent; but a thin, soft membrane had

[1] Contributions from the Bermuda Biological Station for Research, No. 58.

formed across the surface of the break. Five days later, June 25, the protecting membrane had hardened, so that it could not be dented with the point of a scalpel. No further change could be noted until after the molting, which occurred four days later, June 29. The casting occurred at night, and the next morning the new shell showed no signs of any wound. By one o'clock a very slight hump appeared, and by ten o'clock at night a little rudimentary spine 2 mm. in length had formed. The next morning another millimeter had been added to its length. Meantime the normal spine had increased 1.5 mm. in length. No further growth followed before the new shell had hardened.

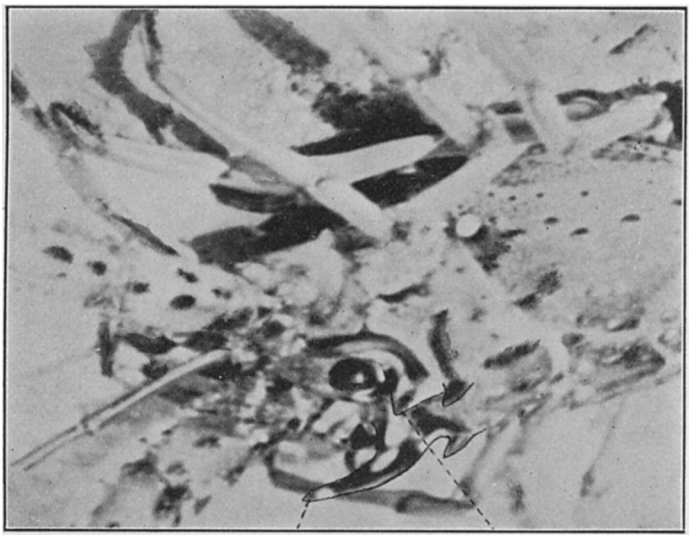

FIG. 1. From a photograph of the left side of the head region of *Panulirus argus*, showing (*norm.*) the normal, and (*regn.*) the regenerated rostral spine. As the figure is reproduced from a photographic print, the picture is reversed, the right spine appearing like a left one.

Sixteen days later, July 15, another molt occurred. As before, the old shell was cast at night and by the following morning the regenerating spine had added 2 mm. to its length, being now 5 mm. long. By the next evening all growth had been stopped by the hardening of the new shell, but the total length of the spine was at this time 7 mm. The spine now showed a sharp point and also a slight lateral compression like that of the normal spine. At this casting the normal right spine added 1 mm. to its length, showing that, while the whole animal was growing, the

regenerating part was increasing at a much faster rate than other parts.

Thus in the period of twenty-seven days during which the animal was under observation, it had undergone two molts and had regenerated a missing rostral spine of normal form, 7 mm. in length, while the normal spine had added 2.5 mm. to its length in the same period. These results show that the period between molts for this animal under laboratory conditions is sixteen days; that a rostral spine of normal form can be regenerated; and that the rate of this regeneration was nearly three times the rate of normal growth of a similar spine during the same period.

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